

ON THE FLOOD IN THE INDIAN BOTANIC GARDEN IN 1978

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ABSTRACT

The Indian Botanic Garden, Howrah, was flooded in October, 1978. Major part of the garden remained submerged for 3 days from 4th to 6th October, the water level rising up to 1.5 m in places. Some areas remained submerged under water for about a week. The damage caused to the garden is estimated and reported here.

The Indian Botanic Garden, Howrah, situated on the right bank of the river Hooghly has suffered from the hazard of cyclones, storms and floods many times during the last two hundred years. Special mention may be made of the devastations wrought to it in the years 1864, 1867, 1868, 1890, 1893, 1900, 1901, 1926, 1940, 1942, 1943, 1971 and 1977.

In the year 1864 the garden was devastated by a cyclonic storm of extraordinary violence which uprooted or broke down the majority of the trees, and devastated the plant houses including all the plants in them. The few trees that escaped on that occasion, were further sadly reduced in number by a second cyclone in 1867. In the opinion of George King, Superintendent of the Garden from 1871 to 1897 it was a pity that the occasion of its destruction by these cyclones was not taken note and plans made to remove the garden to a site on the Calcutta side of the Hooghly. However, the repeatedly destroyed nature of the garden further worsened by the flood of 1868, offered the scope to George King to plan *de novo*, the lay out of the landscape. This is the lay out that exists now.

The river Hooghly which is fed by several other rivers in West Bengal, is normally full

and sometimes in spate during the rainy season. Heavy downpour at the catchment areas swells it further, very often overflowing the banks.

The weather in West Bengal was unusual in 1978. There was 1915.6 mm of rainfall from June to 29th September against 1157.7 mm and 1526.4 mm during the same period in 1976 and 1977 respectively. From 27th to 29th September the rainfall was as much as 708.1 mm, the highest ever recorded in this region for such a short period. Incessant and torrential rain completely disrupted life in Calcutta on 27th Sept., when the whole city was flooded. In 36 hours, the city had 400 mm of rainfall.

The arrangement for the surface drainage of the garden which amply fulfils the normal requirements proved inadequate to meet the needs a phenomenally high rainfall within a short duration. Lakes, ponds and moats were all full and overflowing. Calcutta Port Trust recorded a higher level of water in the river Hooghly and issued a press release on 30th September to the effect, *inter alia*, that high tide in the river might exceed the predicted levels. 10 rivers of West Bengal which were swollen due to heavy rain and flood were draining into the Hooghly. The Hooghly in its turn overflowed both its banks during high tide. The water level during the highest tide at 12.25



Fig. 1. Water rushing over larger areas of the bank.

Fig. 2. Huge mass of water rushing in.

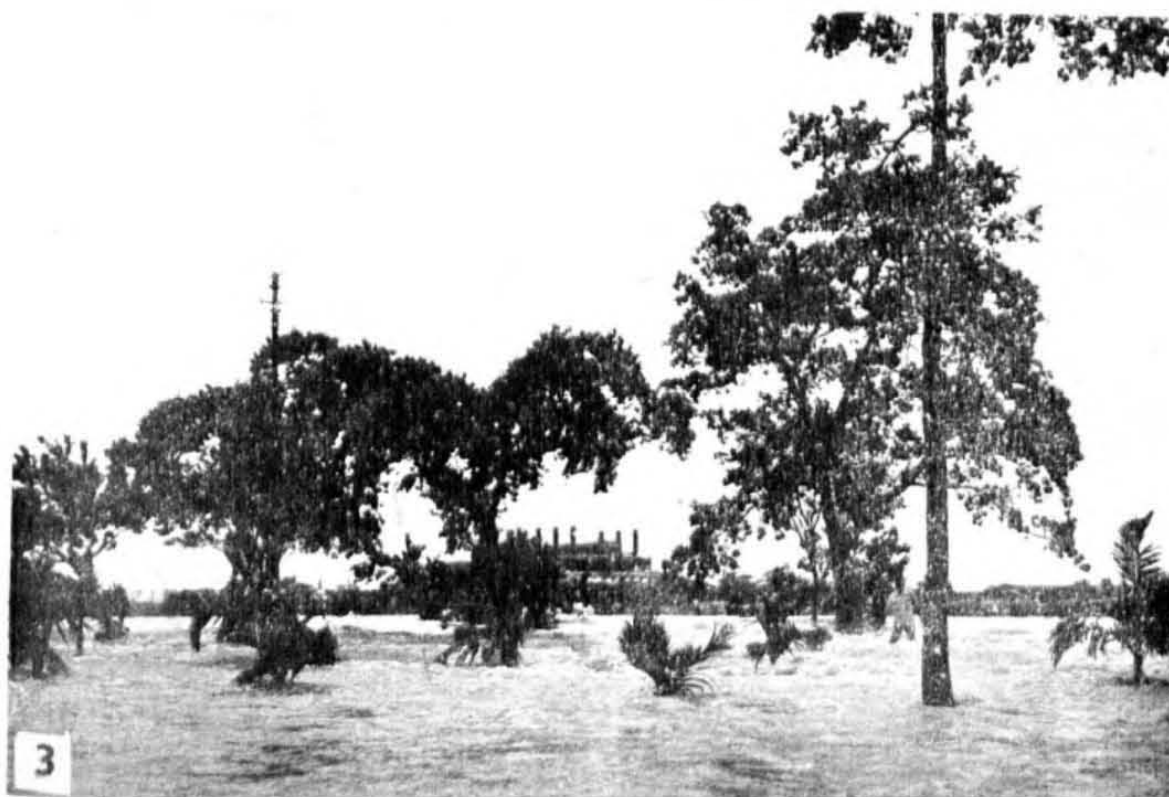


Fig. 3. Garden submerged upto thigh level.

Fig. 4. Front of CNH Building.

p.m. on October 2 rose to 7.35 m at Garden Reach and was lapping the top of the banks. It rained throughout the day on October 3. In the evening the rain intensified and was accompanied by gusty winds. Tide in the Hooghly on October 4 was the highest in recorded history. The water level rose to 7.71 metres at 1.50 p.m. and flooded large areas of the city for the second time in the course of a week. The river overflowed its banks and water started entering the garden in the morning through the depressions on the western side. With the rise in the tidal bore at about 10.30 a.m., the rush increased (Fig. 1). It was rising very rapidly covering larger areas (Fig. 2). With the rise of the bore, huge masses of water entered the garden flooding larger areas and within two hours most of the garden (Fig. 3) was under water, the water level rising up to 1.5 m at many places. It rose nearly to the floor of the Central National Herbarium Building (Fig. 4), knee deep in Roxburgh House, about 1 m in the Garden office, and about 1.5 m in nursery no. 1.

It was a trying time for the management to shift to safer places the files from the garden office; books from the ground floor of the Roxburgh House; potted seedlings from the nursery and the miscellaneous articles in the garden store. Thanks to the efforts and cooperation of staff of various offices, the imminent heavy loss of plants, records and other material was averted.

Soon, all communications were cut off. Members of the staff were stranded in different buildings; families of employees residing in the campus took shelter in the Roxburgh House and other buildings. In the afternoon the chartered buses could not approach the office; somehow they could manage to reach up to the Rest House, whereto the staff had to wade. On the next day also it was not possible to reach the office without wading.

The whole of the western section of the

garden, extending over two thirds of it appeared as an almost unbroken sheet of water. In the eastern section normal conditions were reached within 3 or 4 days, while in the western section, it was not till ten days later that the flood water subsided and the lakes and ponds were again at their normal level.

ASSESSMENT OF DAMAGE

Damage caused to the garden may be considered under the following 3 categories:

1. Plant wealth, 2. Structures and 3. Stored articles.

1. Plant Wealth:

Fortunately, damage to the plant wealth was not as much as initially apprehended.

(a) *Trees*: As the flood was not accompanied by any high wind there was no casualty of trees and shrubs at that time. 13 trees of 10 species, however, died within several months of the flood. This may be attributed to the sodden condition of the ground contributed by the flood. Names of the dead trees with the name of the family and the location in the garden are given below:

Name of the plant	Family	Division No.
1. <i>Bauhinia diphylla</i> F.-Ham.	Caesalpinaceae	21
2. <i>Bischofia javanica</i> Bl.	Euphorbiaceae	1, 15
3. <i>Carallia brachiata</i> (Lour.) Merr.	Rhizophoraceae	12
4. <i>Dalbergia sissoo</i> Roxb.	Papilionaceae	1
5. <i>Eucalyptus viminalis</i> Lab.	Myrtaceae	2
6. <i>Pajanelia longifolia</i> (Willd.) K. Schum.	Bignoniaceae	1
7. <i>Pterygota alata</i> (Roxb.) R. Br.	Sterculiaceae	25
8. <i>Swietenia mahagani</i> Jacq.	Meliaceae	7, 10, 21
9. <i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	1
10. <i>Tectona hamiltoniana</i> Wall.	Verbenaceae	17

It is worthwhile to note that these trees which died were, as might be expected, strangers to the Gangetic region, and that they were located in the lowlying areas of

the garden where waterlogging takes place in normally heavy rains.

(b) *Aquatic plants*: With the rise of the tidal bore the flush of water overflowing the bank damaged the large collection of *nymphaeas* grown in large earthen pots on the lawn adjacent to the bank in Division no. 25. Pots were upturned, freeing the plants which drifted away. However, most of the plants could be recovered and rehabilitated.

Victoria amazonica Sw. (Giant water lily), *Nelumbo mucifera* Gaertn. (Padma) and *Euryale ferox* Salisb. (Makna) with very large floating leaves, growing in the various lakes were uprooted and drifted away. Floating plants like *Eichnormia crassipes* (Mart.) Solms., *Salvinia* sp., *Nymphoides indicum* (L.) O. Kuntze etc. also drifted away from the lakes, spreading in the vast sheet of water.

(c) *Annuals*: Much damage was caused to the seed beds and saplings in the nursery no. 1 which remained submerged for about a week. Seedlings on seed beds of seasonal flowers which perished are listed below.

Name	No. of seedlings
1. <i>Carnation</i>	150
2. <i>Chrysanthemum</i> sp. (44 cultivars)	450
3. <i>Dahlia</i> sp. (29 cultivars)	230
4. <i>Garbera</i>	36
5. <i>Hollyhock</i>	1000
6. <i>Petunia</i>	1000
7. <i>Phlox</i>	1000
8. <i>Tagetes erecta</i> L.	100

(d) *Herbaceous saplings*: Saplings of herbaceous plants alien to the Gangetic climate are grown in the nursery no. 1 for acclimatisation and special care. Some of those which died due to inundation of the area are named below:

Name	No. of plants
1. <i>Agapanthus</i> sp.	1
2. <i>Cymbopogon jwarancusa</i> Jones	1 clump
3. <i>Arisaema consanguineum</i> Schott	2 „
4. <i>Begonia nigricans</i> Bailey	1

Name	No. of plants
5. <i>Chrysanthemum cinerariaefolium</i> Vis	1
6. <i>Dorstenia indica</i> Wall.	1
7. <i>Elettaria cardamomum</i> Maton	4
8. <i>Gentiana</i> sp.	1
9. <i>Lilium concolor</i> Salisb.	1
10. <i>Piper brachystachyum</i> Wall.	2
11. <i>Thalictrum javanicum</i> Bl.	1
12. <i>Urginea indica</i> (Roxb.) O. Kuntze	1
13. <i>Zizania latifolia</i> (Grisb.) Turcz.	2

(e) *Woody seedlings*: Saplings of woody plants i.e. shrubs, trees and lianes, alien to the local environment, which died due to inundation of the nursery no. 1 are as follows:

Name	No. of saplings
1. <i>Acacia concinna</i> (Willd.) DC.	1
2. <i>Acacia decurrens</i> Willd.	1
3. <i>Berberis</i> sp.	2
4. <i>Chorisia speciosa</i> St. Hill	1
5. <i>Cissus pallida</i> Planch.	2
6. <i>Cycas pectinata</i> Griff.	2
7. <i>Eugenia caryophyllata</i> Willd.	2
8. <i>Exacum bicolor</i> Roxb.	2
9. <i>Mussaenda philippica</i> A. Rich.	1
10. <i>Myristica fragrans</i> Hout.	2
11. <i>Oenothera rosea</i> Ait.	1
12. <i>Persia americana</i> Mill. (Avocado)	2
13. <i>Rhododendron nilagericum</i> Zenk.	
14. <i>Solanum willdenovianum</i> Zenk.	1
15. <i>Ulex europaeus</i> L.	1
16. <i>Vitis vinifera</i> L.	1

(f) *Orchids*: In the National Orchidarium orchids are cultivated in an improvised house wherein the following plants died due to long inundation of the pots.

Name	No. of sets
1. <i>Aerides cylindricum</i> Lindl.	2
2. <i>Aerides</i> sp.	2
3. <i>Acampe</i> sp.	3
4. <i>Bulbophyllum</i> sp.	2
5. <i>Coelogyne</i> sp.	4
6. <i>Coelogyne</i> sp.	2
7. <i>Dendrobium macrei</i> Lindl.	1
8. <i>Eria</i> sp.	1
9. <i>Geodorum</i> sp.	1
10. <i>Habenaria</i> sp.	1
11. <i>Liparis</i> sp.	1
12. <i>Luisia</i> sp.	2
13. <i>Oberonia platycaulon</i> Wt.	2
14. <i>Otochilus porrecta</i> Lindl.	1
15. <i>Pholidota imbricata</i> Lindl.	1
16. <i>Vanda parviflora</i> Lindl.	1

(g) *Rare and endangered plants*: Sapling of *Cycas pectinata* Griff., and *Zizania latifolia* (Griseb.) Turcz were introduced from Manipur State in 1978. Though some saplings are lost from the nursery no. 1, others planted elsewhere are growing well. *Aerides cylindricum* Lindl., *Otochilus porrecta* Lindl. and *Vanda parviflora* Lindl. collected from South India in 1978 are not rare, but the garden does not have any of their duplicates.

2. Structure :

The flood caused heavy damage to the garden roads, paths, lawns, revetment and boundary walls. Lakes, ponds and moats were silted. Overflow of the river and high tidal bore exerted undue pressure on the revetment along the river bank. Sudden rush and large accumulation of water laid stress on the boundary wall along the Andul road. The drainage system could not keep pace with the inflow, resulting in the large accumulation of water which rose in height in the garden. It threatened the very existence of the wall along the Andul road. The wall was opened out at different places for releasing the pressure of water on it. In spite of this a long stretch of the wall collapsed near the Housing Board Flats and developed cracks at other places.

The appearance of the inner roads and avenues after the floods was dismal, with erosion of the metalled surface, sometimes in large chunks, depressions, pits and cracks etc. developed in most of the roads, namely, Hooker Avenue, Wallich Avenue, Banyan Avenue, Roxburgh Avenue, Debabrata Avenue, Kurz Avenue, King Avenue, Palmyra Avenue and others. Junctions of Avenues developed larger depressions and

pits. Unmetalled paths particularly those towards majdoor lines, Experimental garden, Plant introduction section and others were very much eroded and damaged.

Restituting of all these would cost from Rs. 15 to 20 lakhs.

3. Stored articles :

The garden implement store attached to the Senior Garden Curator's Office remained inundated for several days. The miscellaneous consumable articles in the store became useless. The loss is estimated to be about Rs. 10,000/-.

CONCLUSION

In the course of the last two hundred years, the Indian Botanic Garden has suffered many times from cyclone, storm and flood. The Quantum of damage done by the cyclone and storm is much more than that done by the flood. If the flood is not accompanied by high wind or storm, there is no immediate danger for the trees. But inundation for longer periods causes their death. Plants of alien environment are harmed by the flood. Local plants seem to remain unaffected. Flood causes more harm to the inner roads and paths than that is done by the cyclone or storm.

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